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OBSERVATIONS ON THE BIOLOGY OF TWO BUTTERFLY SPECIES (LEPIDOPTERA) IN FORESTS OF THE MAMAKU PLATEAU, NORTH ISLAND, NEW ZEALAND.

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ABSTRACT

Observations on habitat use, behaviour, activity and numbers of Helm's butterfly, *Dodonidia helmsii* and the Australian painted lady, *Cynthia kershawi* in forests of the Mamaku Plateau are given. *D. helmsii* was most common where sedges *(Gahnia paucifolia)* were abundant and was on the wing in late December-early January. *C. kershawi* was seen in February and March. The presence of painted ladies with pink-tinged wings indicated the species may have been breeding locally. If so, this is the first recorded instance of overwintering in New Zealand.

KEYWORDS: *Dodonidia helmsii, Cynthia kershawi,* Mamaku Plateau, New Zealand, distribution, seasonality, overwintering.

INTRODUCTION

The New Zealand lepidopteran fauna includes 11 endemic and 12 non-endemic butterfly species. Their life histories and general biology have been reviewed by Gibbs (1980) and more briefly by Gaskin (1966) and Cowley & Cowley (1983).

On several occasions between January 1981 and August 1983 I had the opportunity to make observations on habitat use, behaviour, activity and population size of two nymphalid species, the endemic Helms butterfly, Dodonidia helmsii Butler (subfamily Satyrinae), and the Australian painted lady, Cynthia kershawi McCoy (subfamily Nymphalinae) our commonest immigrant butterfly.

All observations were made during the course of a forest bird

community study in mixed podocarp-hardwood forests on the Mamaku Plateau about 20 km north-northwest of Rotorua (38°10'S, 176°14'E) in the North Island of New Zealand where neither species had been recorded before (Gibbs 1980).

OBSERVATIONS

Dodonidia helmsii

Helms butterfly (or the forest ringlet) is an endemic forest-dweller of restricted distribution. It is known to very few people because of its short flight season, dependence on sunshine for activity and high-level, tree-top flight (Gibbs 1980). During the summer of 1982-83 a population was located in the Mangapapa river valley (grid reference NZMS 260 U15 785545), the main access to which is via Mangapapa Road, a private road on land owned by New Zealand Forest Products Ltd.

Locality

The Mangapapa valley is a steep sided (25-35° slopes) rift in the Mamaku ignimbrite plateau. Its sides have east or west facing aspects and the lower riparian terraces are shaded in early morning and late afternoon. Altitude is 450-550 m a.s.l.

Mixed podocarp-hardwood forest covers the valley which is virtually unlogged. The major vegetation species are listed in Appendix 1. One of these, the sedge Gahnia paucifolia is the favoured larval foodplant of D. helmsii in lowland situations in the North Island (Gibbs 1980). It is widespread in the valley but commonest in forest clearings and on upper-valley slopes.

Flight period

Butterflies were observed in four days during the summers of 1982-83 and 1983-84. One individual was seen on 31 December 1982 on Mangapapa Road in logged forest and many were seen in the valley on 10 and 11 January 1983. However, none were seen on 22 December, 21 January or 3 February 1983 when I also visited the area. At least three butterflies were seen on 4 January 1984 on an upper valley spur where three species had been collected the previous year. Gibbs (1980) stated that D. helmsii appeared to have a flight period of less than one month in any one locality. My observations indicated that this was late December-early January on the Mamaku Plateau.

Butterflies were seen only on warm, sunny, relatively calm days. They were flying between 0855 and 1900 h NZDT but may have been active outside this period. The presence of direct sunlight on the canopy is likely to be a critical factor determining whether flight occurs.

The summer of 1982-83 was affected by a south-westerly airstream which persisted from September to mid-February. This resulted in cooler temperatures than normal and very strong winds. Low rainfall and long sunshine hours resulted in very dry

conditions in most forests of the plateau. The maximum December temperature recorded in nearby Rotorua was 24°C and the air temperature there was less than 20°C throughout the last week of the month. Such low temperatures may have depressed butterfly flight activity. However, temperatures rose to 31.5°C on 10 and 11 January when large numbers of D. helmsii were seen.

Butterfly distribution and abundance

At least 35 individuals were seen in 1982-83 with a maximum of 10 butterflies visible at any one time. D. helmsii was encountered throughout the valley from upper slopes to the river margin. Preferred sites were alongside the river, over and adjacent to land slips (with exposed bedrock) and in natural clearings resulting from tree-falls. Gahnia paucifolia and other grasses were most abundant at these sites and butterfly densities there were probably up to 25-30 per hectare. Other sites included upper valley spurs covered in sedges and kauri grass. Pairs of butterflies were sometimes observed above the forest canopy of the mid-slopes where densities were probably about 5-10 per hectare. No butterflies were seen on the riparian terraces further down the valley where suitable foodplants were scarce.

Behaviour

Typical movement patterns observed were circuits over low sedges and grasses followed by flights up into the sunlit canopy to alight on leaves and flowers. Tawa, kamahi and tawari were all used as perches. Butterflies flew regularly amongst foliage close to the ground as long as direct sunlight was present. Three individuals were collected from a spur where numerous butterflies were flying amongst sedges. When disturbed, they flew rapidly up into the canopy. In January 1984, both kamahi and tawari were flowering and provided an abundant source of nectar for the butterflies.

Future status of the population

The Mangapapa valley is to be reserved for water and soil conservation. However, all adjacent ridges are to be clearfelled and converted to Pinus radiata plantations. An important attribute of the valley is that introduced ungulates are absent and therefore there is virtually no browsing pressure on sedges or other grasses. Possums (Trichosurus vulpecula) which are common, prefer to feed on young shoots or in the upper canopy of trees. Lack of competition for sedges and their overall abundance may help explain the apparently high density of the Helms butterfly population.

The Mamaku Plateau could become an important area for the conservation of the species. However, if cattle are introduced on a grazing lease after pine plantations are established, the Mangapapa valley will need to be fenced off to protect the vegetation and buttefly larvae.

Cynthia kershawi

The painted lady is the commonest of our immigrant

butterflies. Some individuals are observed in New Zealand almost every year and sometimes large numbers invade the country. C. kershawi can breed here but seems unable to overwinter (Gibbs 1980).

Painted ladies are endemic to semi-tropical Queensland (Australia) and those invading New Zealand are found mainly in coastal, western districts. The Mamaku Plateau is neither coastal nor western and therefore is an unusual locality for C. kershawi.

Between 16 and 20 February 1981, 18 painted ladies were seen in the Te Matai State Forest (300-450 m a.s.l.) on the Mamaku Plateau. They were found between the Mangorewa River and Mangatoi Road on ridges which had been clearfelled 3-10 years before for exotic conversion. Exposed pumice soil firebreaks adjacent to remnants of native forest appeared to be the preferred habitat of the butterflies. Gnaphalium sp. and other low growing weeds were common on exposed sites and are suitable host plants in New Zealand (Gibbs 1980). Recently burnt ridgetops with dense coverings of tall weeds 91-3 m high) including Senecio jacobeae and Cirsium lanceolatum generally were avoided by painted ladies. A few were seen on low ground plants in rows cleared for planting Pinus radiata.

Flight periods of painted ladies appeared to coincide with periods of warm weather. Considerable activity was seen on hot afternoons (25-28^{o}C) but only one butterfly was seen on a cool (12-15^{o}C), overcast day. Pairs of butterflies were encountered frequently along forest margins, basking in the sun with wings spread. They rested on fallen debris or on the pumice soil. When approached, butterflies flew rapidly up into the forest canopy but many returned later to their previous perches. Butterflies continually disturbed by my presence at one site, eventually flew off high over a ridge.

According to Gibbs (1980), most painted ladies appearing in New Zealand after New Year have bred locally. Presence of a pinkish tinge (which fades 1-2 weeks after emergence) on the wings is diagnostic of such butterflies. One pink-tinged specimen was collected in 1981 and on 5 March 1982, another was seen on a ridge south of thje Mangorewa River in Te Matai State Forest. The presence of locally bred painted ladies in the same locality in consecutive summers may well indicate that the species overwintered on the Mamaku Plateau, presumably as larve or pupae. If so, this is the first known occurrence of overwintering in New Zealand.

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